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ABSTRACT

The Maryland State Department of Education undertook a longitudinal study of the Extended Elementary Education Prekindergarten Program (which covers prekindergarten through grade 3) in order to examine the school performance of program participants and a comparable nonpreschool group. The study: (1) investigated effects of prekindergarten on participants' school performance; (2) determined whether prekindergarten participation improved economically disadvantaged children's performance to a level comparable to that of children from a variety of socioeconomic backgrounds; and (3) looked for sustained positive effects. Subjects were 356 prekindergarten graduates and 305 nonprekindergarten students. Demographic data about students' family life and preschool experiences was collected, and prekindergarten participation was assessed by means of four outcome measures of school progress and academic achievement. Results showed prekindergarten participants less likely to be classified as at risk, assigned to special education classes, or retained. They also scored better on mathematics portions of the California Achievement Test (CAT) in grades 3, 5, and 8. However, their reading gains diminished by the middle grades. While a comparison of grade equivalent scores showed prekindergarten graduates to perform as well as average children from all socioeconomic backgrounds, CAT scores showed them losing ground in later grades. Thus, gains did not seem to hold over time. (SAK)

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AN ANALYSIS OF THE LONG-TERM EFFECT OF THE EXTENDED ELEMENTARY EDUCATION PREKINDERGARTEN PROGRAM

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INTRODUCTION

Within the last five years, states have shown an increased interest in early education. Nowhere is this more evident than in the political and financial investments they have made in preschool programs, particularly for children living in poverty. Since 1986, more than 20 states have passed legislation mandating or encouraging preschool education in the public schools. In spite of shrinking tax dollars, nineteen states have initiated, maintained, or expanded their own early childhood programs. By 1989, 33 states were spending about one third of a billion dollars for that purpose (Mitchell, Seligson, and Marx, 1989).

What accounts for the renewed public commitment to preschool funding? It may be that a plethora of research on the short-term effects of early intervention for low-income children overwhelmingly shows that it improves intellectual functioning and academic performance in the first few years of school (McKey, et al., 1985; Schweinhart and Weikart, 1986). Or it may be that cost-benefit analyses have convincingly demonstrated that investments in early education yield high returns, in some cases nearly six times the initial cost of a one-year program (Weber, Foster, and Weikart, 1978; Berruetta-Clement, et al., 1984).

One of the most probable reasons is the growing concern over America's political and economic future. Currently, one out of every four students in the United States fails to graduate from high school. The greatest proportion of drop-outs are poor, minority, and/or limited in English proficiency (Hornbeck, 1986). For these students, academic difficulties were frequently evident as early as third grade (Schorr and Schorr, 1988). Many legislators and social policymakers are counting on early education to redirect the course of school failure on which economically disadvantaged children are set early in life. They are hoping that the casual model of positive preschool effects that links short-, mid-, and long-term benefits will play out, resulting in a significantly larger percentage of at-risk children finishing school and becoming responsible, self-sufficient adults.

In spite of the hopes, the evidence is not unequivocal in showing that early education can contribute to success in school and later life. Featherstone (1986), Schweinhart and Weikart (1980), and the Consortium for Longitudinal Studies (1983) all maintain that one of preschool's most significant effects is in helping children meet their schools' expectations and avoid being labeled as failures. Children with early education apparently repeat fewer grades and are placed in special education less often than their non-preschool peers. For example, the New York State Department of Education's evaluation of over 6,000 children who participated in an experimental prekindergarten program revealed that significantly fewer (8%) preschool participants than non-preschool children repeated a grade or spent time in special education. Darlington and Lazar's meta-analysis of number of experimental preschool intervention programs that operated in the early and mid 1960s found similar effects. Across all programs, 44% of the children without preschool education repeated a grade or were assigned to special education; for students who attended preschool figure was only 25%.

When findings from the studies involved in Darlington and Lazar's meta-analysis are examined separately, a different picture emerges. Using placement in special education as the outcome measure, only three of six programs demonstrated statistically significant differences between the non-preschool and early intervention groups. Two of the three programs that significantly reduced assignment to special education were home-, not center-based. Using retention as the outcome measure, only one program--the center-based Harlem Training Project--significantly reduced grade level failures.

Only a modest number of studies have been conducted on preschool's mid-term achievement effects; fewer, still, have examined its long-term impact (Schweinhart and Weikart, 1986). Among studies investigating the longer term effects of early education, most report that initial achievement gains wash-out and disappear around third or fourth grade (Gray and Klaus, 1970; Smith and James, 1975; Irvine and Flint, et al., 1982). However, a longitudinal study of preschool education in Cincinnati, Ohio found significant differences in mathematics and reading achievement at eighth grade as measured by the Metropolitan Achievement Test

(Nieman and Gastright, 1981). A study of the Perry Preschool Project revealed that, at age 14, the achievement test scores of preschool children were, on the average, 1.2 grade equivalent units higher than those of non-preschoolers. Results from reading, mathematics, and language achievement subtests followed a similar pattern and increased in magnitude of effect from first grade onward.

In 1974, the Educational Research Service, a research organization established and sponsored by the Council of Chief State School Officers and National Association of Elementary School Principals, among other education organizations, reviewed more than 40 studies on the impact of early education. On of its primary conclusions was that the findings are mixed in regard to preschool's effectiveness in raising economically disadvantaged children's performance to middle class norms. More recent findings support that conclusion.

Preliminary results from an assessment of Philadelphia's Prekindergarten Head Start found the program to be effective in raising the educational attainment of low-income children to a level comparable to the district's norms on standardized tests administered through grade three (Philadelphia School District, Office of Research and Evaluation, 1982). Similar effects were noted through grade five for Chicago's Parent-Child Centers, but only for center graduates who were kept in intact classes through the elementary grades (Institute for the Development of Educational Auditing, 1974). Hebbeler, (1985) found that although Head Start improved the performance of low-income children, when their performance was compared to that of higher income students, achievement discrepancies persisted through elementary school and beyond. Early intervention did not improve educationally disadvantaged children's achievement to the extent that they could compete on an equal footing with any peer group.

Findings from research indicate that different preschool programs have different effects on children. High quality programs can have a positive impact on the later school performance of low-income children but they don't always. It is thus naive to believe that the benefits of early education are guaranteed solely by its provision. Many of the preschool programs that resulted in positive educational outcomes were model demonstration projects with human and material resources far beyond those typically available to programs operated on a much wider scale. In addition, many were specifically developed with research purposes in mind. They were rigorously planned, very carefully implemented, and stringently supervised (Darlington, 1983). This may be more than can be expected of more typical field programs that are constrained by the conditions of everyday school practice.

There are few longitudinal evaluations of state-funded prekindergarten programs. The New York State Department of Education reported mixed mid-term effects for its experimental prekindergartens. The South Carolina State Department of Education began following its program participants in 1987. Initial findings indicate that prekindergarten increased children's readiness for first grade, if a level of program quality was maintained.

Given the limited research available on the long-term effects of state-funded prekindergarten education, in 1982, the Maryland State Department of Education (MSDE) initiated a longitudinal study of its Extended Elementary Education Prekindergarten Program (EEEP). This retrospective study examines the on-going school performance of program participants and a comparable non-preschool group. Study participants are now 16 years old. The major questions the study address are:

1. In comparison to a similar group with no known preschool experience, what effect does prekindergarten have on participants' school performance?

2. Does prekindergarten participation improve economically disadvantaged children's performance to the extent that they achieve at a level comparable to that of children from a variety of socioeconomic backgrounds?

3. If prekindergarten leads to higher achievement, are the differential effects sustained over time? Does the achievement gap between the prekindergarten and non-preschool groups widen as they progress through school?

PREKINDERGARTEN PROGRAM BACKGROUND

The Maryland State Department of Education provides limited funds to public school systems to operate prekindergarten as part of the Extended Elementary Education Prekindergarten Program. The impetus for the development of the EEEP program came from former State Superintendent David W. Hornbeck who was concerned about the lack of publicly funded preschool opportunities for Maryland's neediest children. As a result of expressing his concern to the State Board of Education, Resolution No. 1978-17 was passed.

It directed MSDE to develop a program to extend elementary education to four-year-olds with a high potential for school failure. The Resolution also called for coordination in each school system between prekindergarten and existing programs for kindergarten and the early elementary grades.

EEEP encompasses prekindergarten through grade three. Its overall goal is to provide quality experiences that will help children develop and use the basic competencies necessary for success in the middle and later learning years and beyond. Guidelines for the implementation of the prekindergarten program are loosely structured at the state level to allow for local adaptation based on local school system philosophies and the needs of children being served by each school. The state guidelines to which each local school system receiving program funds must conform have remained the same since the program's initial inception. As currently outlined in Standards for Implementing Quality Prekindergarten Education (Maryland State Department of Education, 1987), they include:

Prekindergarten Education

* Two daily sessions that operate a minimum of 2-1/2 hours each
* A ratio of 20 children to two adults, one of whom is a state-certified early childhood education teacher and the other of whom is a full-time assistant
* A curricular focus on all aspects of development
* A balance in learning through small group teacher-facilitated experiences and child-initiated activities. Reliance on an open-framework approach to program implementation.
* Ongoing assessment of each child's growth and development primarily through observation

Continuity of Learning

* Cross-grade staff communication and cooperation to ensure continuity of learning beyond prekindergarten
* Careful attention to initial placement when children move from one grade level to the next
* Careful attention to within-grade pacing to accommodate individual strengths and needs

Home-School Cooperation

* Daily opportunities for parents to participate in the school-based program
* Parental involvement in extending learning outside of school

Program Staff

- Regular and on-going program support and supervision by central office personnel
- Training to increase local school staff's understanding of and skill in implementing appropriate and effective early childhood programs

Accountability

- Annual school and school system evaluations of program appropriateness and program effectiveness in meeting state and/or locally identified goals
- Local school system participation in state-conducted evaluations of program impact

Although EEEP began in 1978, it was not implemented as a unified program until the following year. In September 1979, EEEP prekindergartens operated in 33 schools in eight school systems throughout the state. A teacher coordinator assigned to each school assisted with planning, implementation, and staff training. Today, the state-funded program is being implemented in 163 schools in 23 school systems statewide. State funds pay most teacher and aide salaries. Federal and local funds absorb additional personnel costs as well as expenses for transportation, materials, and supplies. The teacher coordinator position is no longer supported by state dollars.

METHOD

Subjects. This retrospective study was initiated in the 1982-83 school year when the second wave of prekindergarten graduates were in second grade. To achieve the research objectives, 17 schools that operated the program during the 1979-80 school year were selected using random proportional sampling methods. These 17 schools represented seven local school systems and were located in rural, suburban, and urban areas throughout the state. Within each school, prekindergarten and kindergarten class rolls of 1979-80 and 1980-81 were used to identify potential study participants. All children on the prekindergarten rolls were assigned to the treatment group if they had a 1975 birth date, no known history of group experiences such as day care or Head Start, and if they had attended kindergarten in the same school as prekindergarten. All children on the kindergarten rolls were assigned to the control group if they had a 1975 birth date, no known history of group experiences, and had not been retained in kindergarten. Using these criteria, an initial group of 577 students were identified as treatment group and 476 were identified as the control group.

In the follow up study that took place in 1983-84, it was decided to limit this study to only those students who had remained in the same local school system in which they had begun their schooling. Consequently those students who had transferred out of state, to another local school system within the state or to a non-public school were not included in the follow up study.

Data collected on students' demographic and background characteristics, as listed in Table 1 below, showed a remarkable similarity between the two groups. In fact tests of differences between proportions and means of a number of demographic variables resulted in few statistically significant differences. Even when means of some indicators (eg. mothers' education or mothers' occupation) were statistically different, this difference in practical terms (11.7 years of education versus 10.8 years) did not signify a meaningful advantage as the average mother in both groups had not completed high school. In the case of the number of siblings the two numbers 1.63 and 2.07 for all practical purposes amount to a total of two siblings with no meaningful difference even though statistically they may differ.

Occupational data were coded from 1 to 11 with persons not in the work force receiving a rank of 1 and laborers, for example, a rank of 2. Occupations were assigned to categories on the basis of their score on the Index of Occupational Status (Reiss, Occupations and Social Status). This particular scale was used as a reference because it takes both education and income into consideration. It thus provided some information

not otherwise available. While mothers' occupation for the prekindergarten group averaged 3.0 to 2.13 for the non-preschool group these averages did not represent practical difference while statistically they were significant.

Table 1

Background Characteristics of the EEEP Prekindergarten and Non-Preschool Group at the Time of School Entry

Background Characteristic	Group			
	Prekindergarten N=356	Non-Preschool N=305	F value	p=
Both Parents in the Home	.53	.49	1.07	.30
Proportion Minority	.71	.74	.74	.39
Proportion Male	.47	.51	1.07	.30
Proportion Older **	.70	.65	1.82	.36
Mother's Education (in years)	11.70	10.80	32.98	* .00
Father's Education (in years)	11.90	11.40	2.80	.10
Mother's Occupational Status	3.00	2.13	18.44	* .00
Father's Occupational Status	4.41	4.11	1.19	.28
Number of Siblings	1.63	2.07	14.62	* .00
Number of Persons in Household	4.50	4.57	.29	.59

*** Difference is statistically significant.**
**** Children born between January 1 and August 31, 1975.**

Data Collection. In addition to demographic data which included parents' occupations and educational levels, presence or absence of both parents in the home, number of adults living in the home, and number of siblings, academic data for each child were collected from student records. Information concerning each child's preschool experiences and the number of schools previously attended was also recorded as a part of the academic history.

The effect of prekindergarten participation was assessed using four outcome measures classified into two categories: school progress and academic achievement. The school progress category included three measures related to students' success in meeting the minimum requirements of one grade level and their readiness to move to the next. Used as evidence of unsatisfactory progress were risk status in kindergarten as determined by the Maryland System Teacher Observation Instrument (MSTOI), retention, and assignment to special education on a full-time basis. Academic achievement was appraised using standardized test scores. Basic skills achievement was compared using the reading comprehension, total language, and total mathematics subtests of the California Achievement Test (CAT) that was administered in the fall of third, fifth, and eighth grades to meet state accountability requirements.

Students who had been retained or placed in special education classes were excluded from the California Achievement Test analyses. This is because the level of the achievement tests they took was different from the level they would have taken had they made normal progress through the grades. Comparing the achievement of retained third graders, who otherwise would have taken a fourth grade achievement test, to that of untrained third graders may have resulted in an inaccurate picture of the retained groups' actual achievement.

Group comparisons in performance on the California Achievement Test are reported using scale scores (S.S) and grade equivalents (G.E.) Scale scores are three-digit numbers ranging from 000 to 999. They are useful in plotting trends and making comparisons across groups. Grade equivalents, like scale scores, also extend cross grade levels. They represent the typical performance of the average student in an average school in a particular school year. For any particular grade equivalent score, 50% of students in the national norm sample are above this norm and 50% are below it.

Comparisons using grade level equivalents should be cautiously interpreted. The grade equivalents should not be viewed as an indication of the grade level at which a particular group is functioning. If, at third grade, the non-preschool group scores 5.0 on the reading comprehension subtest of the California Achievement Test, the only conclusion that can be drawn is that students in the non-preschool group thoroughly mastered reading comprehension skills taught in the first four grades. The 5.0 grade equivalent score does not mean that students in the group are ready for fifth grade work. Furthermore, national norms merely represent the average score made by students in the standardization sample. Whether the performance of groups that are compared to the national norms is "good" or "bad" depends upon a number of factors such as the ability level of students in the comparison group and the opportunities they have had to learn what was tested.

Data Analysis. Since study participants had not been randomly assigned to the two groups of pre-kindergarten students and non-preschool students, it was important to see how well-matched each other in so far as their background/demographic indicators were concerned. Using test of difference between proportions and analysis of variance for mean differences, we observed that the two groups were very similar in this background variables. Table 1 shows that the two groups were very similar in terms of the proportion of students who had both parents at home. The non-preschool group had slightly smaller proportion with both parents at home (49% to 53 % for prekindergarten group) and had a slightly larger proportion of minority members (74% to 71% for the prekindergarten group). Father's education for the group were almost identical (11.4 vs 11.9) and father's occupational status were very similar (4.11 vs 4.41 on a scale of 1 to 11). Slight differences in the average of mothers education (10.8 to 11.7), though statistically significant, were of little practical importance. Same observation could be made about mother's occupation (2.13 to 3.00 on a scale of 1 to 11) ad the number of siblings in the family (1.63 to 2.07) or the number of persons in the household.

Based on these observations, the two groups' third grade achievement scores in reading comprehension, language arts and mathematics were compared using the California Achievement Test (CAT) package were compared. A series of univariate analysis of variance test for each CAT subtest measure showed that the prekindergarten group were clearly ahead of the non-preschool group in every testing area. These results were incorporated in the fifth grade and eighth grade testing programs. The question of interest was whether prekindergarten group's academic achievement advantages of the third grade would persist or even increase at the fifth and eighth grade levels. An analysis of covariance was performed using the third grade results as the covariate. The analytic concept underlying this approach was to decompose the explained variance in the dependent variable (achievement scores) as functions of the covariate and factor (grouping) effect. Each of the three subtest scores were analyzed and based on the effect of the covariate (third grade results), mean-achievement-scores for the fifth or eighth grade were adjusted. Test of homogeneity of variances indicated that assumption of the analysis of covariance were not violated.

Study Limitations. This longitudinal study had three limitations. The first sample-related limitation was differential attrition. By eighth grade, approximately 9.5% of the subjects group were no longer attending school in the system in which they had started. This amounted to 8.1% attrition rate for the pre-kindergarten group and 11.1% for the non-preschool groups.

Among participants in this study who were unavailable for follow-up, the majority had either moved out of state or transferred to a non-public school. Limitations imposed by confidentiality laws, geographical location, and differences in student assessment procedures made it impractical to collect data on such children. Omitting them from the study may have biased the results, but since nothing is known about them,

no conclusion can be drawn about the direction of the bias.

Another sample-related limitation was differential enrollment. While participation in both prekindergarten and kindergarten in Maryland is voluntary, enrolling one's child in school two years earlier than required may have been indicative of some additional educational motivation on the part of the parent. If more of the children who participated in prekindergarten had parents who were more concerned about their children's educational attainments, then greater home support might have given the children an edge in terms of school success anyway. Differential enrollment could have biased the study in favor of finding an effect for the prekindergarten group.

According to Lazar (1989), IQ scores are not particularly good predictors of the school achievement of educationally disadvantaged children. According to Schweinhart and Weikart (1981), intelligence is the key to initial school success. Although the relationship between intelligence and early school performance is much debated, aptitude or ability is usually included as an independent variable in studies of educational effects. In this study, data were not available or could not be obtained on children's entering abilities. Demographic variables, age, and sex of students were used to determine group equivalency instead.

RESULTS: PREKINDERGARTEN'S IMPACT ON LATER SCHOOL PERFORMANCE

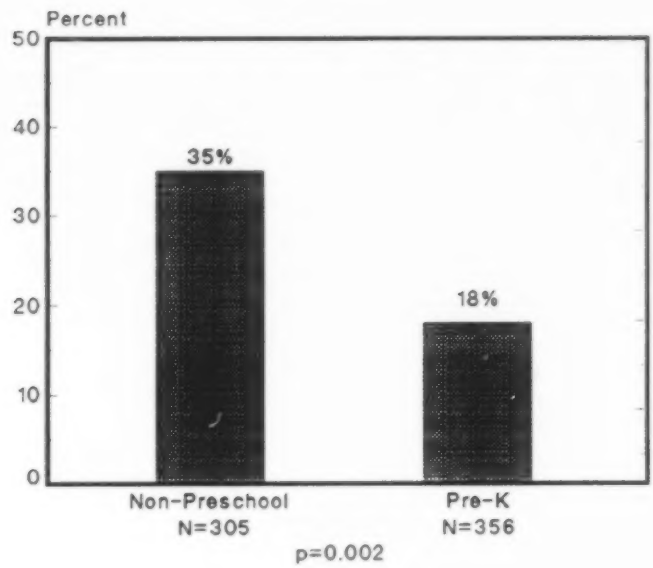
Question 1. In comparison to a similar group with no known preschool experience, what effect does prekindergarten have on participants' school performance through eighth grade?

School Progress: Risk Identification in Kindergarten

Each fall, public school kindergarten teachers in Maryland are required to screen their students for potential learning problems. In the fall of 1980, screening occurred through teacher observation using items on the Maryland Systematic Teacher Observation Instrument (MSTOI) as the basis. A cut-off score was applied to MSTOI results to identify children who may be at-risk for first grade learning difficulties. At-risk children received further assessment and, if necessary, interventions to ameliorate their problems. Figure 1 indicates that in fall 1981, 15% more children without preschool experiences than with prekindergarten backgrounds were identified as being at-risk. Prekindergarten apparently helped a significant number of its former participants acquire the personal, social, physical, and intellectual skills necessary to enter first grade ready to learn.

Figure 1

Percentage of Prekindergarten Students and Non-Preschool Students Identified as Being At-Risk in Kindergarten Fall 1980

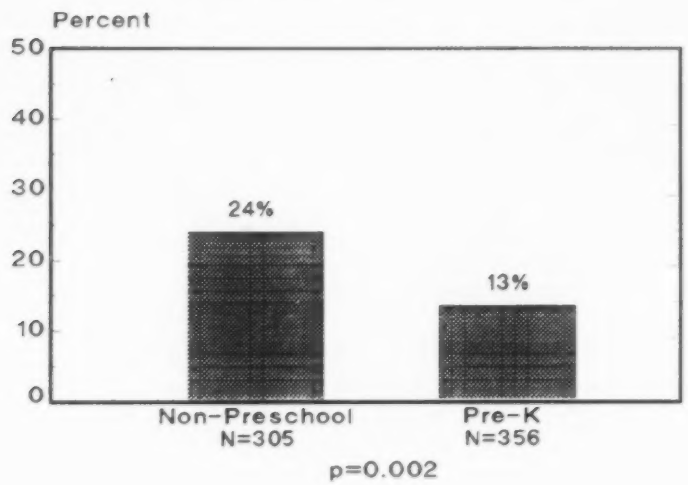


School Progress: Special Education Placements

Special education statistics only include those who were placed in the program on a full time basis. The findings indicate that prekindergarten significantly reduced the number of children who were identified as being handicapped and placed in special education. Through fifth grade, only 13% of prekindergarten students were identified as being handicapped and placed in special education. This compared to almost twice as many students (24%) who were identified as special education students in the non-preschool group.

Figure 2

Percentage of Prekindergarten Students and Non-Preschool Students Assigned to Special Education Through Fifth Grade

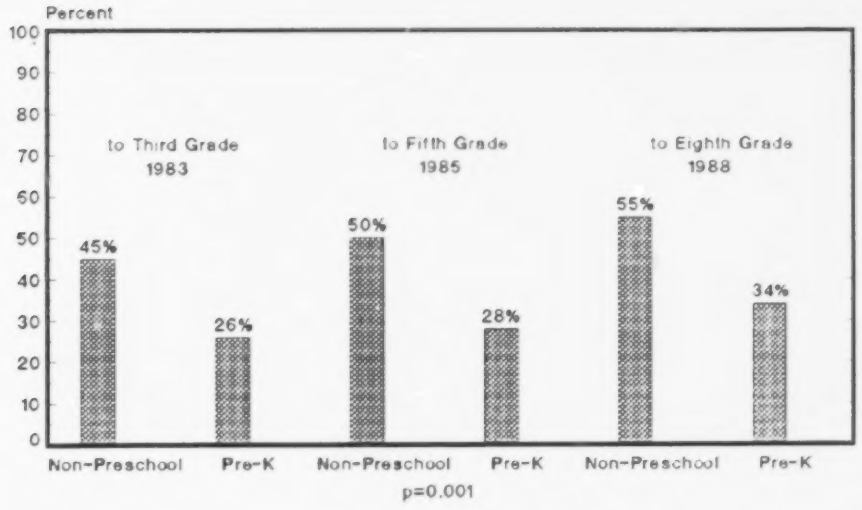


School Progress: Retention

The third measure of school progress used to evaluate prekindergarten program impact was the percentage of children in each group who had been retained in grade at least once during their school careers. The retention findings include children who were placed in special education subsequent to failing grade or grades. Figure 3 shows that through the middle learning years prekindergarten students had a significantly smaller percentage of retention. At third, fifth, and eighth grades, there was an average 20% difference in cumulative retention rates between the prekindergarten and non-preschool groups. For both the prekindergarten and non-preschool groups the highest rate of retention occurred prior to third grade. In no instances could differences in the percentages of grade level retentions be attributed to the effects of age or gender.

Figure 3

Cumulative Retention Rates for Prekindergarten Graduates and Non-Preschool Students at Third, Fifth, and Eighth Grades



Academic Achievement: California Achievement Test Results

Tables 2-4 summarize the two groups' mean scale scores on the measures of academic achievement. In many cases, test score means are not based on the total number of third, fifth and eighth graders in each group, presumably because of their absence from school during the testing period. The data reveals differential achievement favoring the prekindergarten group in all cases. Students in the prekindergarten group scored significantly higher than the non-preschool group on the reading comprehension, total language, and total mathematics subtests of the California Achievement Test at third, fifth and eighth grades.

However, Charts 1, 2 and 3 point out an important finding. Each chart compares the two groups' scaler achievement gains in one of the CAT subtests at the fifth and eighth grade levels. Chart 1 for example, shows that students in either subgroup (prekindergarten or non-preschool) gained approximately 90 points as they progressed from the third to fifth grade. Each subgroup also gained approximately 170 points from the third grade to the eighth grade. Thus, there was no difference between the two groups in the number of points gained in reading comprehension. Chart 2, likewise, shows a gain of approximately 95 points at the fifth grade level and 150 points at the eighth grade level in language arts. Mathematics, however, indicated a different pattern of gain. As shown in Chart 3 the two subgroup average gains were very close with a slight advantage for the prekindergarten group (94.7 vs 91.8 for non-prekindergarten), but they become significantly higher at the eighth grade level (200.4 vs 188.4). These observations indicate that while a differential gain in reading and language arts for the prekindergarten group is sustained through the middle learning years, this advantage does not increase as they go through the fifth and eighth grade. Mathematics advantage, however, is cumulative, in that the early gains by the prekindergarten group results in greater gain as these students go through middle school and beyond.

California Achievement Tests:
Mean Scale Scores and Standard Deviations
for the Prekindergarten and Non-Preschool Groups

Table 2: Third Grade Results
Fall 1983

Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	260	397.92	50.47	256	428.68	56.51	260	369.64	35.23
Non-Preschool	163	380.08	45.78	164	404.08	51.51	163	355.52	28.42

$F = 14.06$ $p < 0.05$ $F = 21.16$ $p < 0.05$ $F = 20.52$ $p < 0.05$

Table 3: Fifth Grade Results
Fall 1985

Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	214	488.28	52.89	213	520.23	52.37	214	464.35	39.97
Non-Preschool	119	468.01	51.10	119	500.61	53.88	118	447.30	37.22

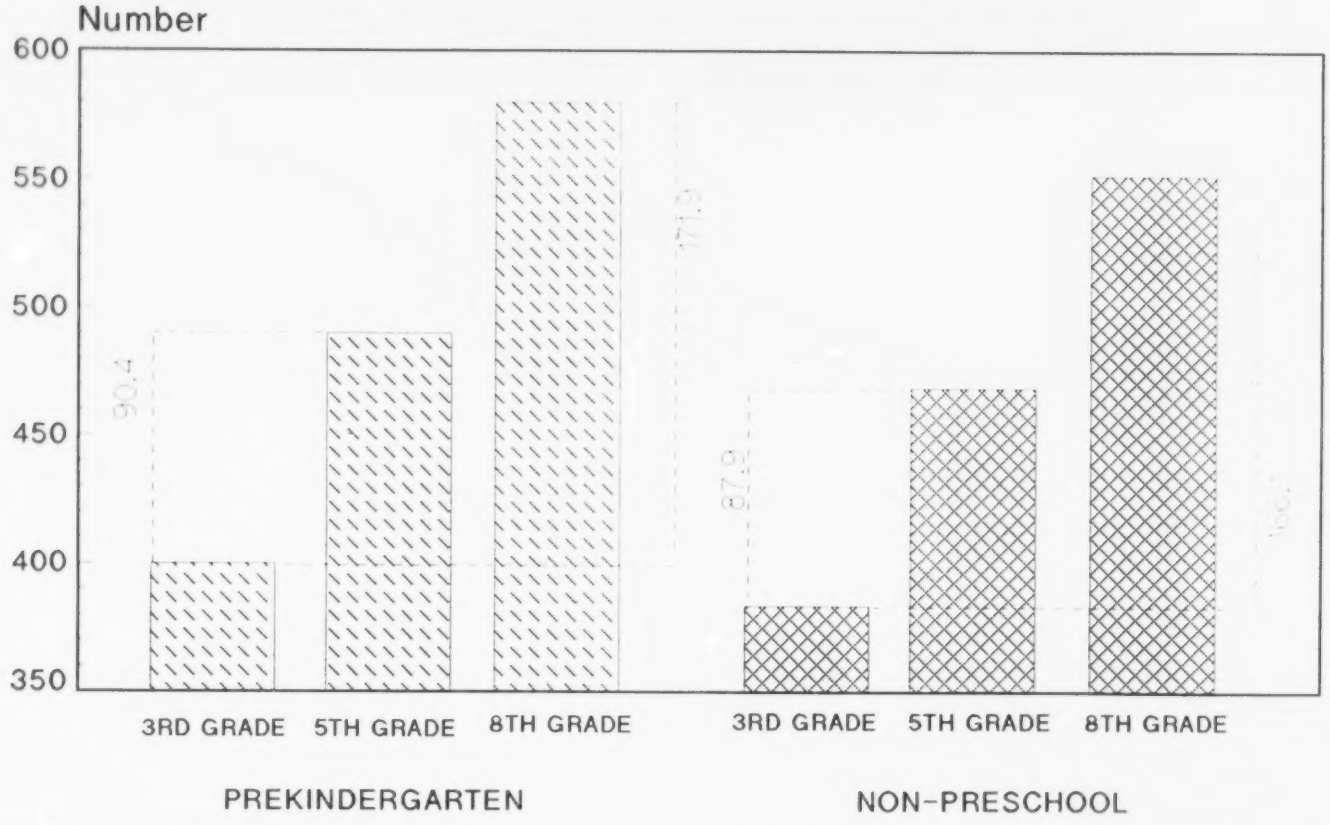
$F = 11.70$ $p < 0.05$ $F = 10.30$ $p < 0.05$ $F = 15.13$ $p < 0.05$

Table 4: Eighth Grade Results
Fall 1988

Group	Subtest Area								
	Reading Comprehension			Total Language			Total Mathematics		
	N	X	SD	N	X	SD	N	X	SD
Prekindergarten	198	568.89	68.85	198	578.57	57.57	197	570.03	52.42
Non-Preschool	115	546.18	66.43	114	558.33	59.44	115	543.96	53.43

$F = 8.29$ $p < 0.05$ $F = 8.59$ $p < 0.05$ $F = 17.56$ $p < 0.05$

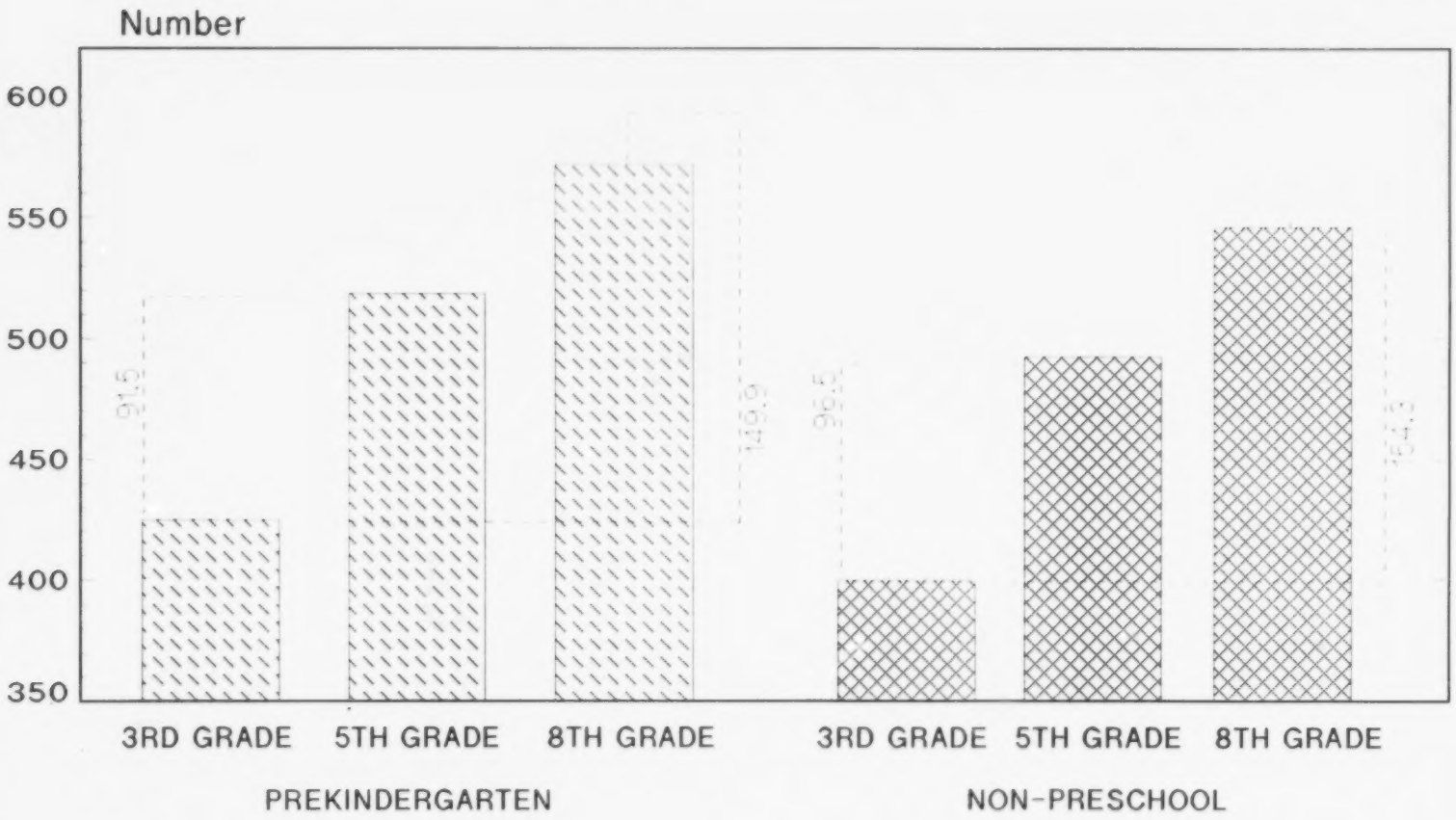
MEAN READING COMPREHENSION ACHIEVEMENT FOR PREKINDERGARTEN AND NON-PRESCHOOL



* CALIFORNIA ACHIEVEMENT TEST

CHART 1

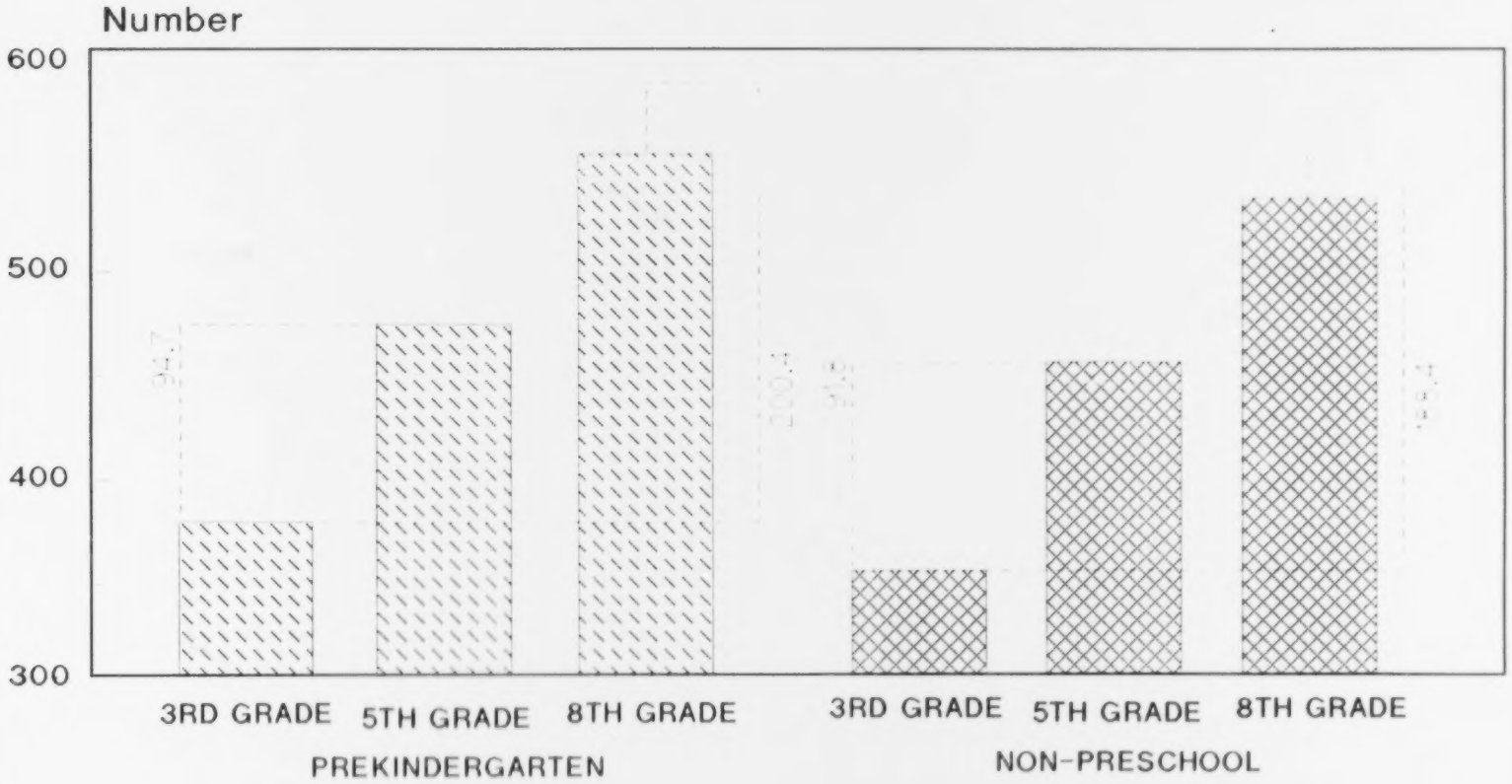
MEAN LANGUAGE ARTS ACHIEVEMENT *
FOR PREKINDERGARTEN AND NON-PRESCHOOL



* CALIFORNIA ACHIEVEMENT TEST

CHART 2

MEAN MATHEMATICS ACHIEVEMENT *
FOR PREKINDERGARTEN AND NON-PRESCHOOL



* CALIFORNIA ACHIEVEMENT TESTS

CHART 3

Question 2. Does prekindergarten participation improve economically disadvantaged children's performance to the extent that they achieve at a level comparable to that of children from a variety of socioeconomic backgrounds?

Using Achievement As the Criterion Measure

As the average student in the prekindergarten group moved through elementary and middle school his or her performance pulled significantly ahead of the average student in the national norm sample. At third grade the prekindergarten group was one to two months below the national norm sample in reading comprehension and language arts, and only two months ahead of it in mathematics. By eighth grade, the average student in this group was about a year ahead of the average eighth grader in the national norm sample in reading comprehension and language arts, and a half a year ahead in mathematics. If national norms on the California Achievement Test are used as the measure of comparison, then the conclusion can be drawn that prekindergarten helps the average economically disadvantaged children achieve at a level comparable to that of average children from a variety of socioeconomic backgrounds.

Table 5

Average Grade Equivalent Scores for the Prekindergarten Group in Comparison to the National Norm Sample and Statewide Average

Group	Grade 3			Grade 5			Grade 8		
	Reading Comp	Total Lang	Total Math	Reading Comp	Total Lang	Total Math	Reading Comp	Total Lang	Total Math
Statewide Average	3.5	3.7	3.4	6.1	7.1	5.9	10.0	10.3	9.9
Prekinder-garten	**3.1**	**3.3**	**3.3**	**5.8**	**6.6**	**5.7**	**9.2**	**9.6**	**9.1**
Non-Preschool	2.5	2.7	2.9	5.5	5.5	5.3	8.1	8.4	8.3
National Norm Sample	3.3	3.4	3.1	5.5	5.6	5.3	8.4	8.3	8.5

The picture is different if Maryland's average CAT scores are used as the measure of comparison. At third and fifth grades the prekindergarten group was four months below the statewide average in reading comprehension and language, and one month below in mathematics. At fifth grade the achievement gap remained about the same. By eighth grade, however, the average student in the prekindergarten group had lost ground. (S)he was performing approximately seven months below the average eighth grader in Maryland in all subtest areas. This difference is educationally significant. While prekindergarten helped improve disadvantage children's performance to the extent that they demonstrated thorough mastery of the early and middle learning program curriculum, it had not yet improved their achievement to the point that it was comparable to that of students in Maryland from a variety of socioeconomic backgrounds.

Question 3. If prekindergarten leads to higher achievement, are the differential effects sustained over time? Does the achievement gap between the prekindergarten and non-preschool groups widen as they progress through school?

California Achievement Test: Adjusted Mean Scale Scores for the Prekindergarten and Non-Preschool Groups

Table 6: Third Grade Adjusted Mean Scales Scores

Group	Grade 5		
	Reading Comprehension	Total Language	Total Mathematics
Prekindergarten	483.38	515.41	460.60
Non-Preschool	476.89	510.74	455.24

F=2.02 p>0.05 F=1.01 p>0.05 F=2.33 p>0.05

Table 7: Eighth Grade Adjusted Mean Scale Scores

Group	Grade 8		
	Reading Comprehension	Total Language	Total Mathematics
Prekindergarten	563.97	573.36	565.12
Non-Preschool	556.12	567.40	551.52

F= 1.22 p>0.05 F=1.03 p>0.05 F=5.9 p<0.05

The magnitude of achievement gains over time was examined controlling for group differences in third grade achievement using scores on the reading comprehension, total language, and total mathematics subtests of the California Achievement Test. As Table 6 reveals, at fifth grade there were no significant differences in achievement between the prekindergarten and non-preschool groups in any subtest area. At eighth grade, (Table 7), a significant difference was noted on the mathematics subtests only.

The findings disclose that in the areas of language arts, and reading comprehension any achievement benefits that prekindergarten bestowed were acquired prior to third grade. Beyond third grade, differences persisted but the achievement gap between prekindergarten and non-preschool students did not widen. In mathematics, higher achievement at third grade ultimately led to greater achievement by grade 8. Differences between the prekindergarten and non-preschool groups widened over time only in the area of mathematics.

DISCUSSION AND CONCLUSIONS

The EEEP prekindergarten longitudinal study is being conducted to examine the effects of early education on low-income children's later school performance. In this phase of the study, the effects of prekindergarten were traced from kindergarten through eighth grade. The overall findings show that prekindergarten participation sets in motion a linear path of effects and consequences that ultimately leads to improved academic performance through the middle learning years. Whether higher academic performance results in a lower drop-out rate will be determined in the next few years.

The pattern of findings for EEEP prekindergartens adds to the existing body of research evidence indicating that if preschool is institutionalized as part of public education, it can provide its participants with long-term achievement benefits. Like experimental preschool projects, public school prekindergarten can help keep participants from becoming sidetracked into extra grades, or alternative programs such as special education that can become dead-end tracks. Through the early learning years alone, EEEP prekindergarten participation reduced both grade level failure and special education placements by slightly less than 50%. EEEP prekindergarten participation did more than just boost test scores temporarily as many studies have shown. As measured by the California Achievement Test, it had a significant long-term achievement effect that persisted through the middle learning years. The fact that at eighth grade, prekindergarten students were performing approximately one year ahead of their non-preschool counterparts is particularly impressive, considering that their prekindergarten experience had occurred eight years earlier.

In this study, prekindergarten experience as well as absence of such an experience demonstrate their greatest impact during the early childhood period. At the beginning of school, prekindergarten seems to offset deficits in children's home environments that lead to cognitive, behavioral, or motivational deficiencies that interfere with their readiness to learn. In kindergarten, former prekindergarten participants were 50% less likely than their non-preschool peers to be identified as being at-risk for learning problems. The majority of grade level retentions occurred through the fourth grade. Thereafter, the cumulative retention rate for each group increased by about 5%. The basic direction of language arts achievement was established by the third grade. From fourth through eighth grades the magnitude of each group's achievement gains remained relatively stable. Except in the area of mathematics, prekindergarten students did not pull further ahead; nor did their non-preschool counterparts catch up.

One of the reasons that may account for the effectiveness of the EEEP prekindergarten program is that they incorporated many of the elements of model programs that operated in the early and mid 1960s. Teachers were early childhood certified and received on-going training. Staff-student ratios were high, the programs were closely supervised by teacher coordinators, and prekindergarten was closely linked to kindergarten, thereby smoothing the transition from one level of early childhood education to the next. In a sense, each prekindergarten operated as a model program. It will be interesting to see whether prekindergarten has the same impact, if and when it becomes part of the educational continuum and is taken more for granted.

In addition to being carefully controlled, the program in each school system had clearly defined goals and objectives and a carefully implemented curriculum. The curriculum specified a broad array of knowledge and skills that were fostered through a balance of deliberate teaching experiences and child-initiated activities. Many preschool programs err in being too open-ended or overly-directive. Lacking an appropriate balance between these two extremes may not be optimal for promoting later academic advantages, After all, the formula for successful learning beyond prekindergarten includes knowledge and skills, interest and inclination, and knowing how to learn.

Findings from this study indicating that public school prekindergarten can bestow benefits to its participants should be viewed with cautious optimism. The study had some methodological shortcomings, not the least of which was the lack of data on children's entering abilities. As the Consortium Longitudinal Studies pointed out in "Lasting Effects After Preschool", the loss of subjects over time is the most basic hazard of longitudinal research. It is important to know not only the rate of attrition but, also, whether the lost subjects were different in some way from those available for follow-up study.

The highest rate of attrition for the prekindergarten group occurred immediately following prekindergarten, and for both groups, during the early childhood years. By fourth grade, over one-third of the children in each group had left the school systems where they had started school. Prekindergarten graduates and their non-preschool peers enrolled in non-public schools and moved out-of-district at about the same rate. Had they all remained in the study, it isn't possible to suggest what the results would have been.

Self-selection may also jeopardize the validity of the findings. It is often assumed that parents who voluntarily enroll their children in school earlier than required are more interested in their education. As the argument goes, with greater home support, the prekindergarten group may have done better anyway. By the end of the decade of the 1970s, the demand for day care already exceeded its availability. Parents thus enrolled their children in preschool for a variety of different reasons, including both education and child care. If children were enrolled in EEEP prekindergartens for a combination of reasons, then self-selection may not be threat to the validity of the results.

This retrospective study of EEEP prekindergarten program effects corroborates findings from other studies with more stringent research designs. It confirms that prekindergarten that is institutionalized as part of the public schools, by improving children's performance in the early elementary grades, prevents them from experiencing later academic difficulties that can have serious long-term consequences. In summary, prekindergarten experience should be provided as part of a well-coordinated, comprehensive program that is fully integrated in the continuum of student's schooling experience from prekindergarten through grade 12.

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